All Ceramic Crown

All ceramic crowns are some of the most esthetically pleasing prosthodontic restorations.

Advantage :

1- superior esthetic

2- excellent translucency (similar to that of natural tooth structure, because there is no metal to block light transmission)

3- good tissue response

4- Lack of reinforcement by a metal sub structure permit slightly more conservative reduction of facial surface

Disadvantages :

1- reduced strength of the restoration because of the absence of reinforcing metal substructure.
2- Significant tooth reduction is necessary on the proximal and lingual aspects due to the need for a shoulder-type margin circumferentially. 3- Porcelain brittleness

4- All ceramic restoration do not tend themselves well to use as retainers for a fixed partial denture.
5 Wear has been observed on the functional surface of natural teeth that oppose Porcelain restoration.

Indications :

1- a high esthetic requirement exists

2- proximal or facial caries that can not longer be effectively restored with composite resin .

3- Because of the relative weakness of the restoration , the occlusal load should be favorably distributed. Generally , this means that the centric contact must be in an area where the Porcelain is supported by tooth structure (i.e. in a middle third of a lingual wall

caries

trauma

amelogenesis imperfecta

Dentinogenesis imperfecta

large midline diastema

Grossly discolored

R.C.T

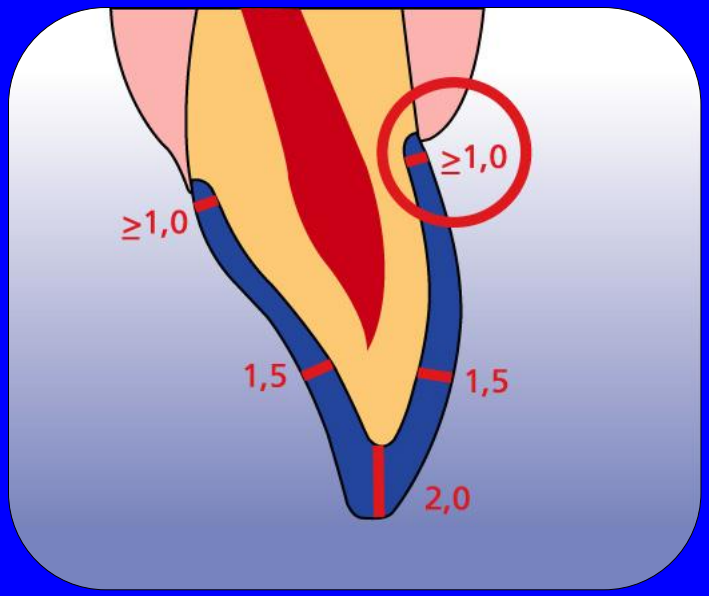
Contra indications :

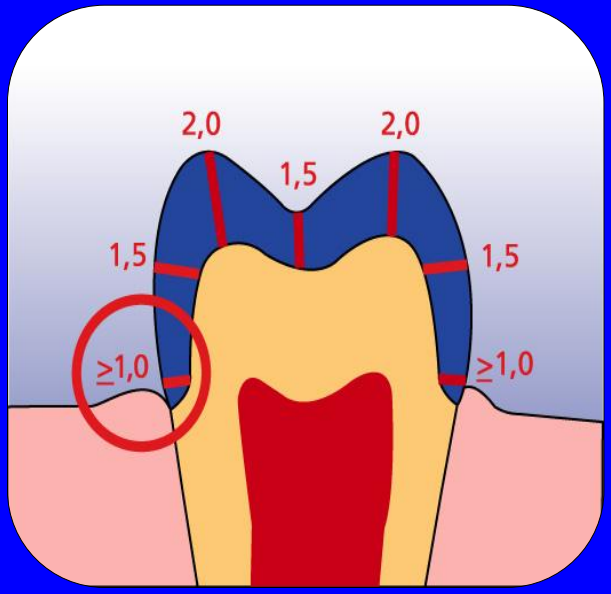
1- when a more conservation restorative can be used.

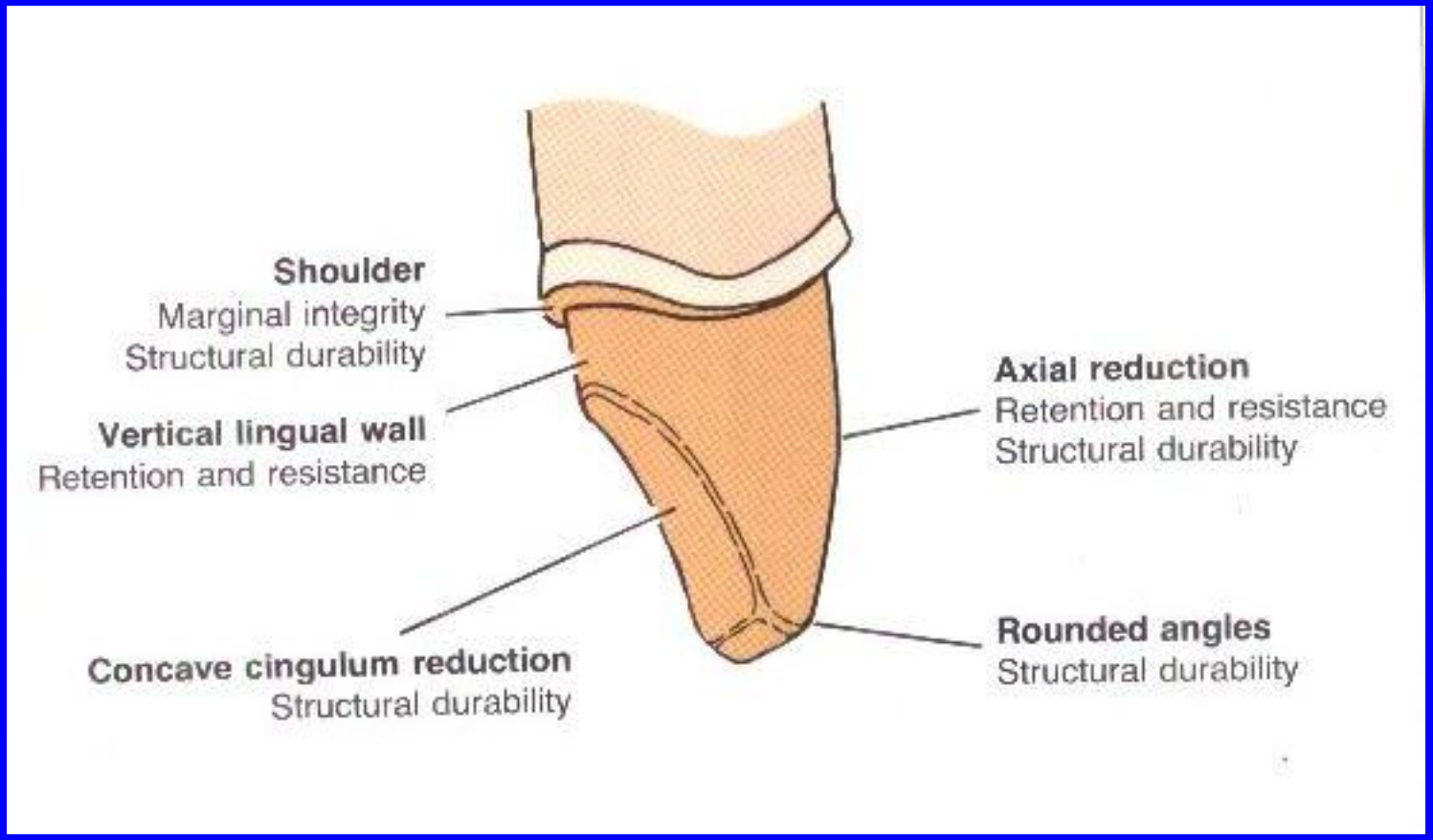
2- Rarely are they recommended for molar teeth. (Increased occlusal load and the reduced esthetic demand).

3-It is not possible to provide adequate support or an even shoulder width of at least 1 mm ircumferentially

Procedure of preparation

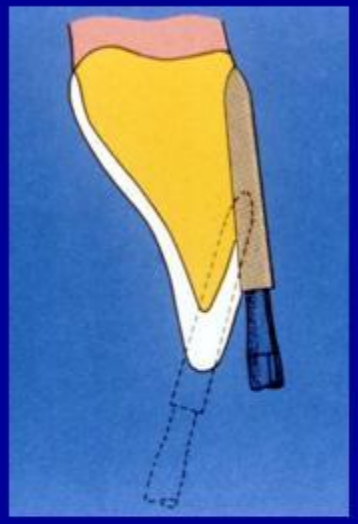


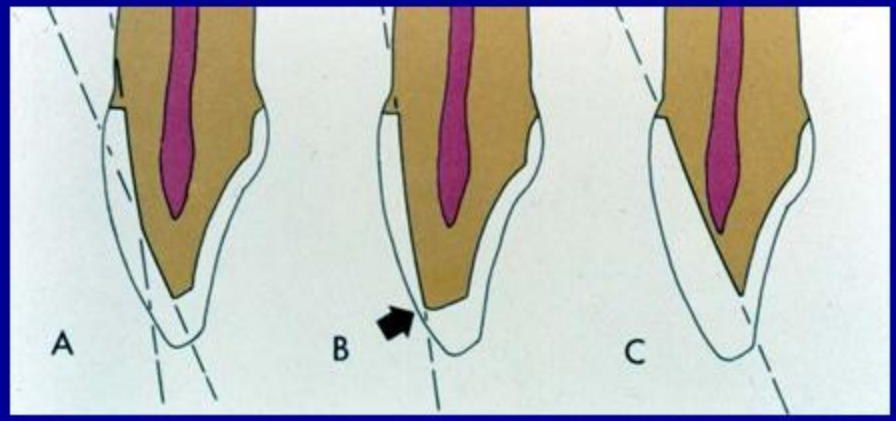



Shoulder
Marginal integrity
Structural durability
Vertical lingual wall
Retention and resistance
Concave cingulum reduction
Structural durability
Axial reduction
Retention and resistance
Structural durability
Rounded angles
Structural durability

ALL – CERAMIC RESTORATIONS

THE LABIAL SURFACE OF AN ALL-CERAMIC PREPARATION IS DONE IN TWO PLANES TO ACHIEVE ADEQUATE CLEARANCE FOR GOOD ESTHETICS WITHOUT ENCROACHING ON THE PULP.

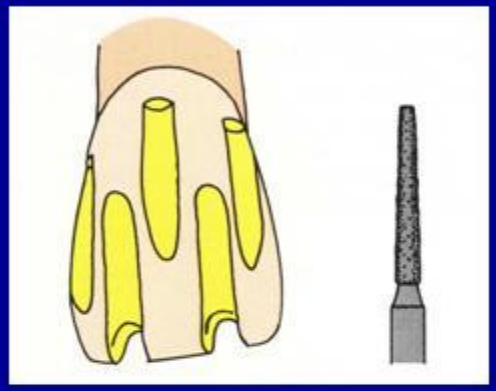


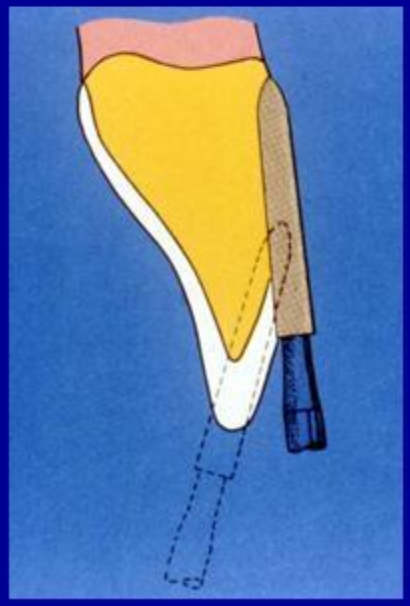


ALL – CERAMIC RESTORATIONS

THREE LABIAL GROOVES ARE CUT WITH THE DIAMOND HELD PARALLEL TO THE GINGIVAL ONE-THIRD OF THE LABIAL SURFACE.

A SECOND SET OF TWO GROOVES IS MADE PARALLEL TO THE INCISAL TWO-THIRDS OF THE UNCUT LABIAL SURFACE.

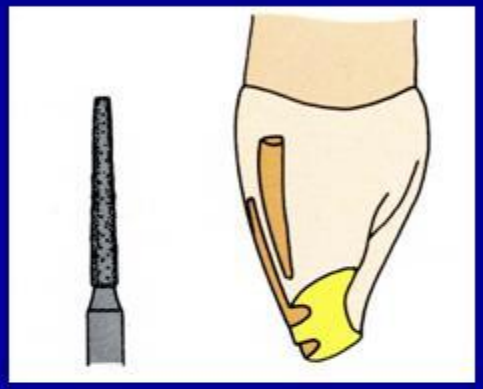




ALL – CERAMIC RESTORATIONS

STEP NO 2 :

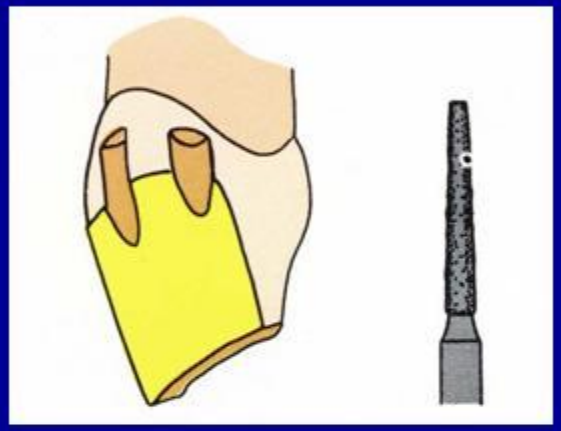
INCISAL REDUCTION (2mm)
USING ROUND-END TAPERED DIAMOND



ALL – CERAMIC RESTORATIONS

STEP NO 3:

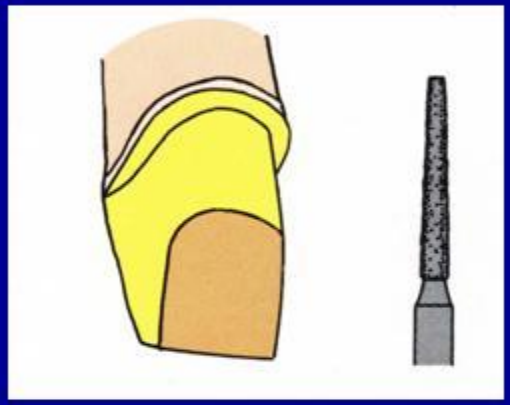
LABIAL REDUCTION
(INCISAL HALF)
USING ROUND-END
TAPERED DIAMOND



ALL – CERAMIC RESTORATIONS

STEP NO 4:

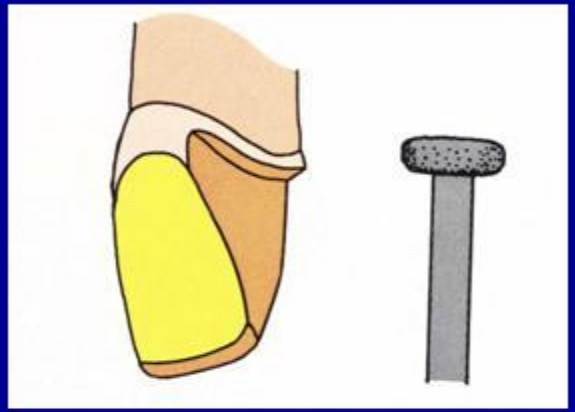
LABIAL REDUCTION
(GINGIVAL HALF)
USING ROUND –END
TAPERED DIAMOND



ALL – CERAMIC RESTORATIONS

STEP NO 5:

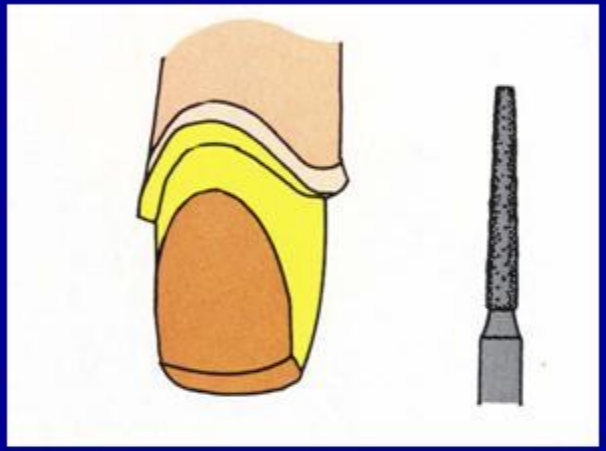
LINGUAL REDUCTION USING SMALL WHEEL DIAMOND



ALL – CERAMIC RESTORATIONS

STEP NO 6:

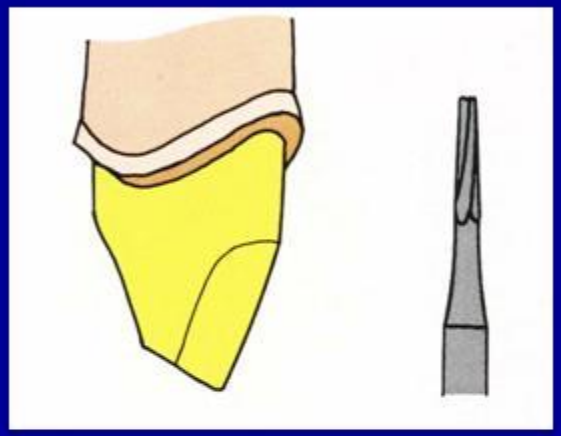
LINGUAL AXIAL REDUCTION USING ROUND-END TAPERED DIAMOND

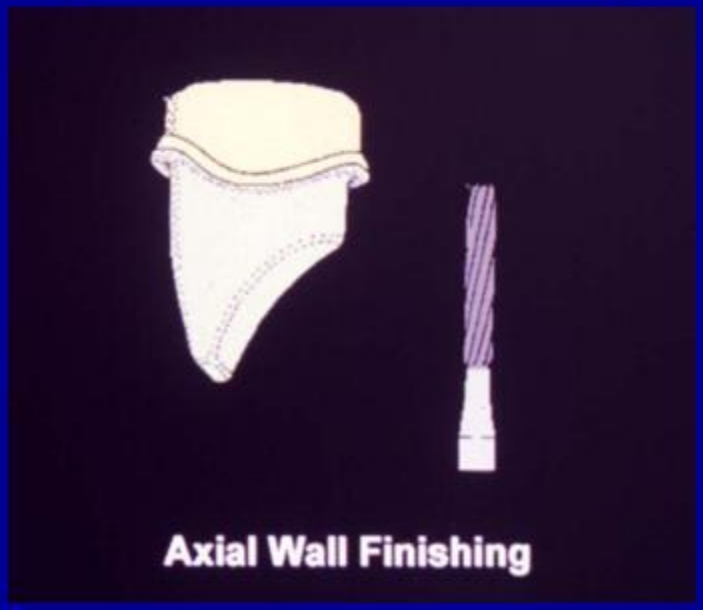


ALL – CERAMIC RESTORATIONS

STEP NO 7:

AXIAL WALL AND
RADIAL SHOULDER
FINISHING USING
RADIAL FISSURE BUR

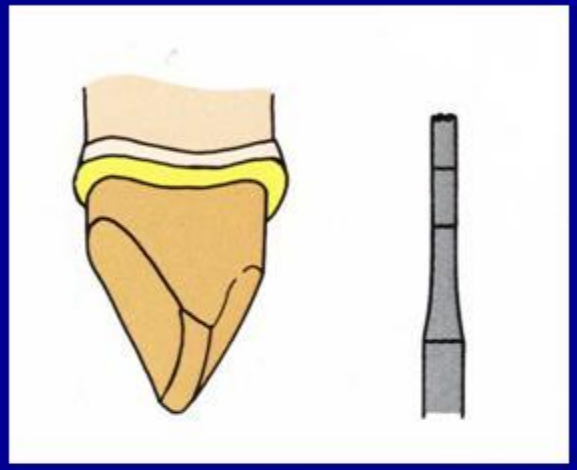


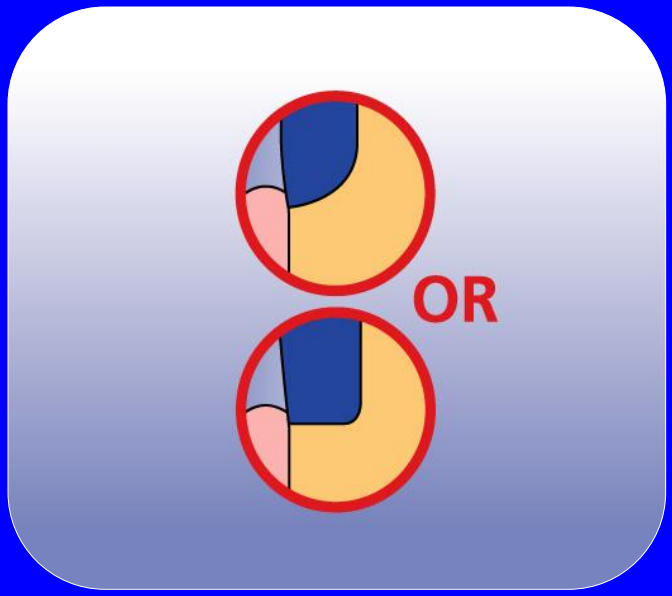


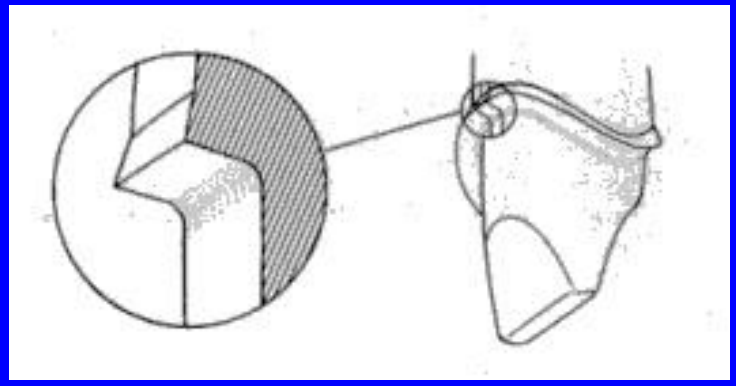
ALL – CERAMIC RESTORATIONS

STEP NO 8:

FINAL FINISHING AND ROUNDING ALL SHARP ANGLES







Finish line

Fabrication of all ceramic crown

ALL – CERAMIC RESTORATIONS

- HISTORICAL BACKGROUND

THE FIRST ALL-CERAMIC CROWN WAS DEVELOPED BY LAND IN 1886 AND WAS KNOWN AS THE PORCELAIN JACKET CROWN

ALL – CERAMIC RESTORATIONS

IN 1965 MACLEAN DEVELOPED A PORCELAIN JACKET CROWN WITH AN INNER CORE OF ALUMINOUS PORCELAIN CONTAINING 40% TO 50% OF ALUMINA CRYSTALS TO BLOCK THE PROPAGATION OF CRACKS RESULTING IN A RESTORATION TWICE AS STRONG AS THE TRADITIONAL PORCELAIN JACKET CROWN.

Composition of traditional dental porcelain

Generally conventional dental porcelain is a vitreous ceramic based on silica network and feldspar. Other additives like pigments, opacifiers and glasses are added in smaller concentrations

Dental Porcelain:

Ternary Composition = Mixture of K9O-Al9O:-SiO9 made by mixing;
clays, feldspars, and quartz

FELDSPAR = Anhydrous potassium alumino silicate

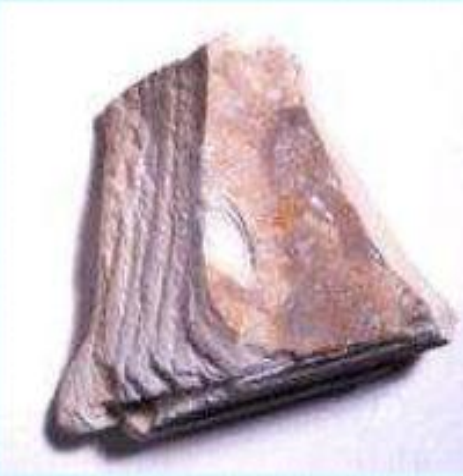
QUARTZ = Anhydrous Silicate

CLAY(KAOLIN) = Hydrated alumino silicate

Composition

FELDSAR

Quartz



Kaoline

PORCELAIN JACKET CROWNS

Low strength and toughness was a serious problem of Porcelain jacket crowns

Modern dental ceramics systems attempt to overcome this defect

HIGH-STRENGTH CERAMICS

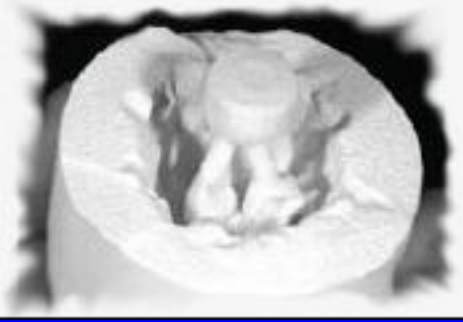
- Aluminous core ceramics (Platinum matrix)
- Slip cast ceramics (refractory die)
- Heat pressed ceramics
- Machined ceramics
- **-(a) *Cerec system***
- **-(b) *Procera All-Ceramic System***
- **-(C) *Celay system***
- Machined and sintered ceramics

Slip casting on refractory die

EMPRESS 2

Wax and invest

Press ceramic



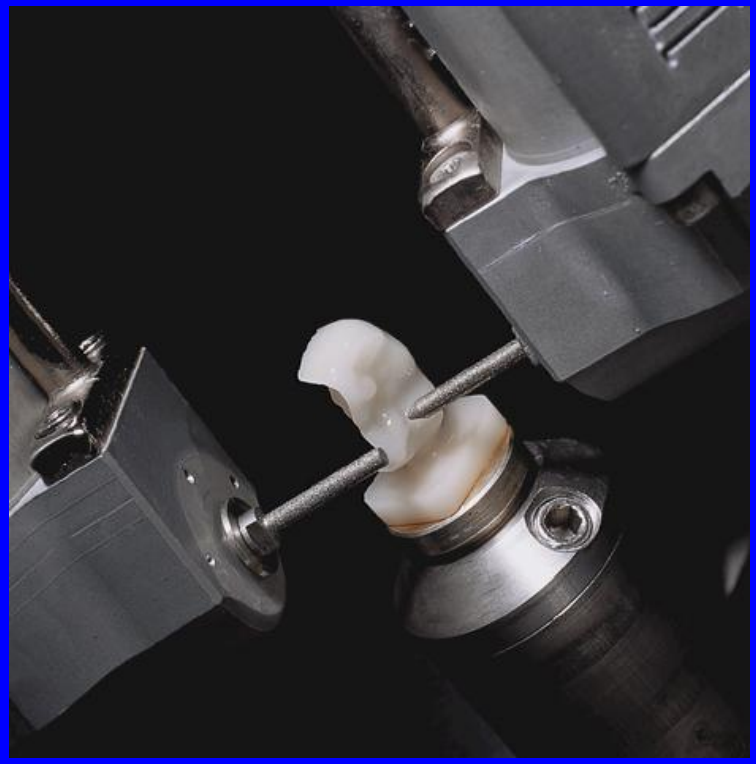
Divest pressing

Heat pressed ceramics

- Leucite based
- Lithium silicate based

Machinable ceramics

Non-contact digitizing



PROCESSING OF PORCELAIN JACKET CROWNS;

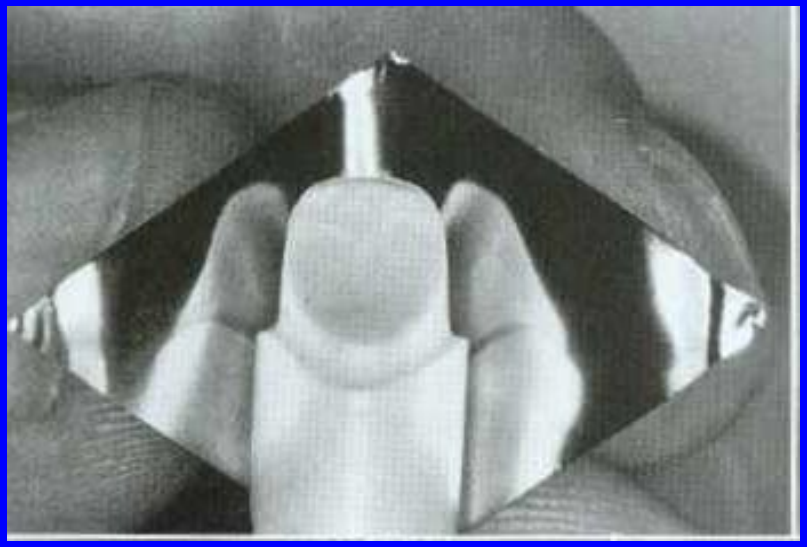
- Platinum matrix formation

- Compaction

- FIRING

- GLAZING

platinum foil matrix:



diamond-shaped foil is adapted to the facial surface

Two cuts are made, one to each incisal corner, and a triangle of foil is removed by cutting at 45 degrees toward the corners

The foil is folded onto the lingual surface and burnished

gathered on the lingual surface with tweezers and adapted with finger pressure

The foil is trimmed to follow the lingual contour evenly. The two ends are separated, and one is trimmed to exactly half the width of the other

The long end is folded over the short, and relieving cuts are made . Then the three-thickness joint is folded toward the short end

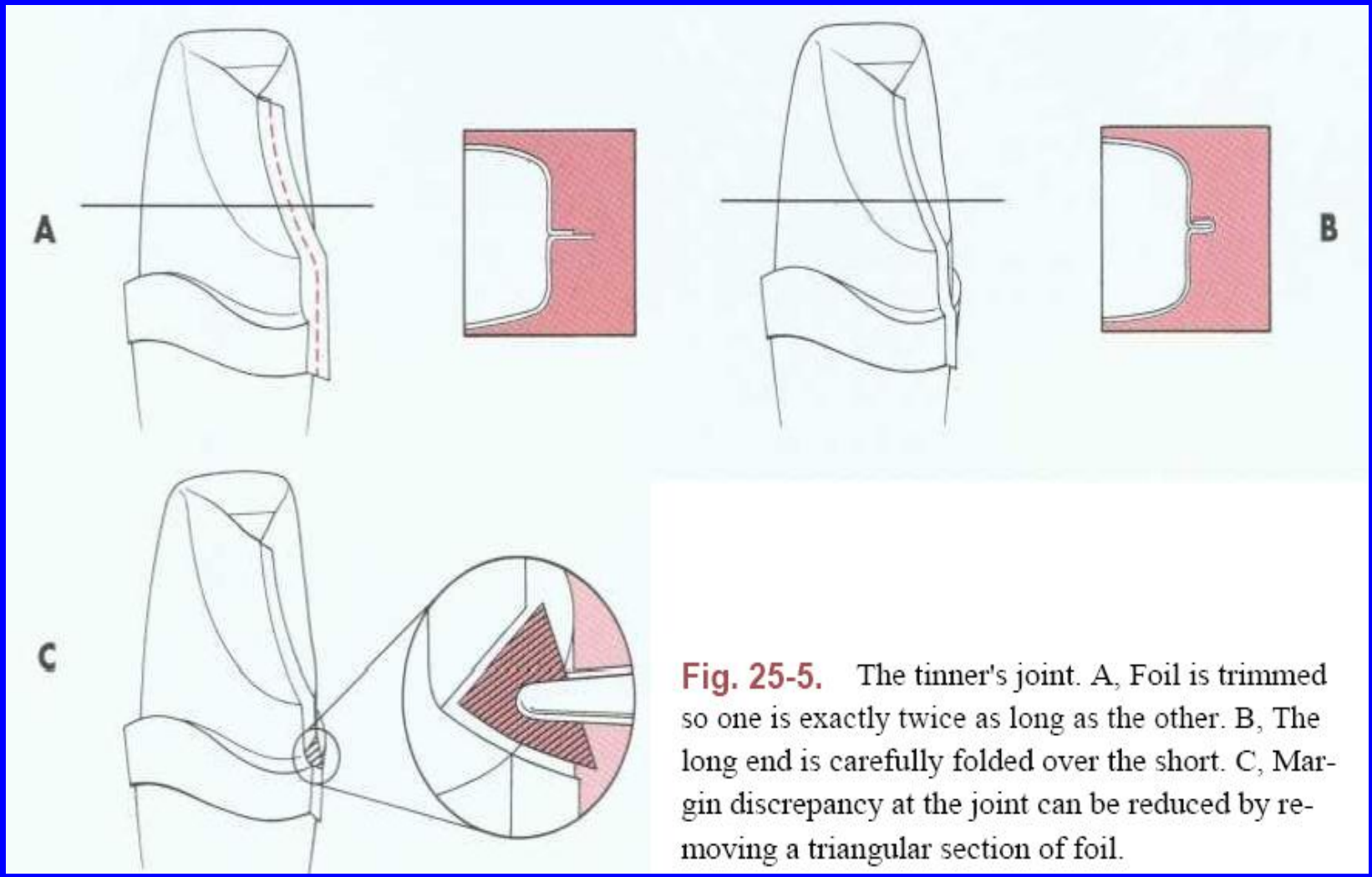


Fig. 25-5. The tinner's joint. A, Foil is trimmed so one is exactly twice as long as the other. B, The long end is carefully folded over the short. C, Margin discrepancy at the joint can be reduced by removing a triangular section of foil.

The foil is adapted with a wooden point, always starting from the incisal edge and working toward the margin

A beaver-tail burnisher is used to adapt the margin, working the foil toward the internal angle to prevent a perforation.

The matrix is removed with sticky wax (K) and annealed in a Bunsen flame to relieve work hardening.

The completed platinum foil matrix

Compaction:

The porcelain powder in the color selected for the body or dentin portion is mixed with distilled water to a creamy consistency and is applied in the correct proportion to the platinum matrix with allowance made for shrinkage i.e. about >:% oversized.

To produce minimum shrinkage and less porosity in the fired porcelain thorough condensation must be achieved by one of the following methods:

1- vibration
2-addition of dry porcelain powder
3-spatulation method

vibration

Spatulation

Dry powder

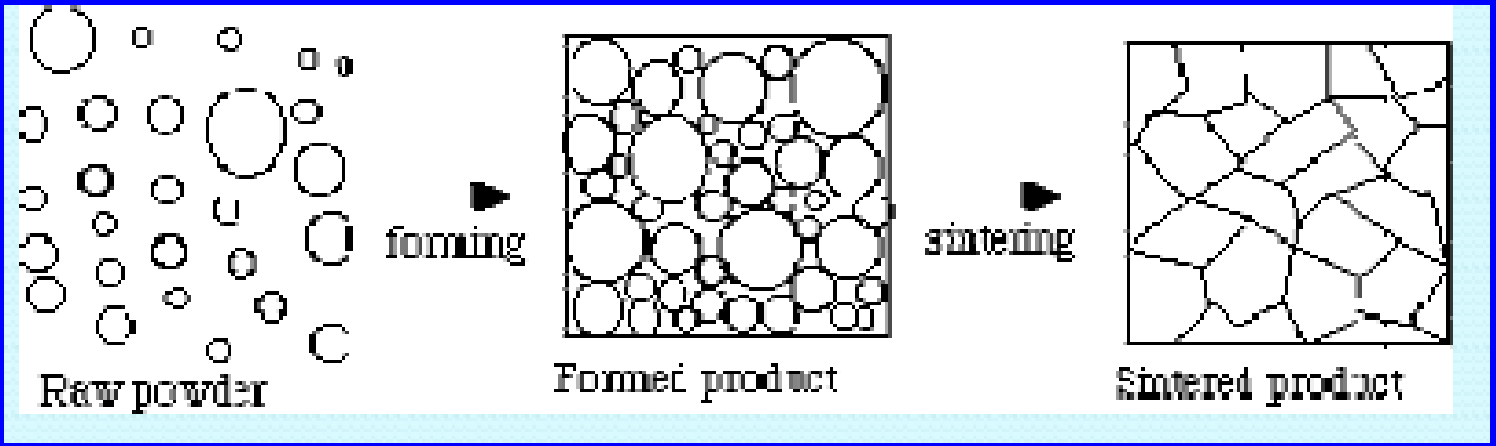
Firing procedure:

During firing, the porcelain undergoes several changes:

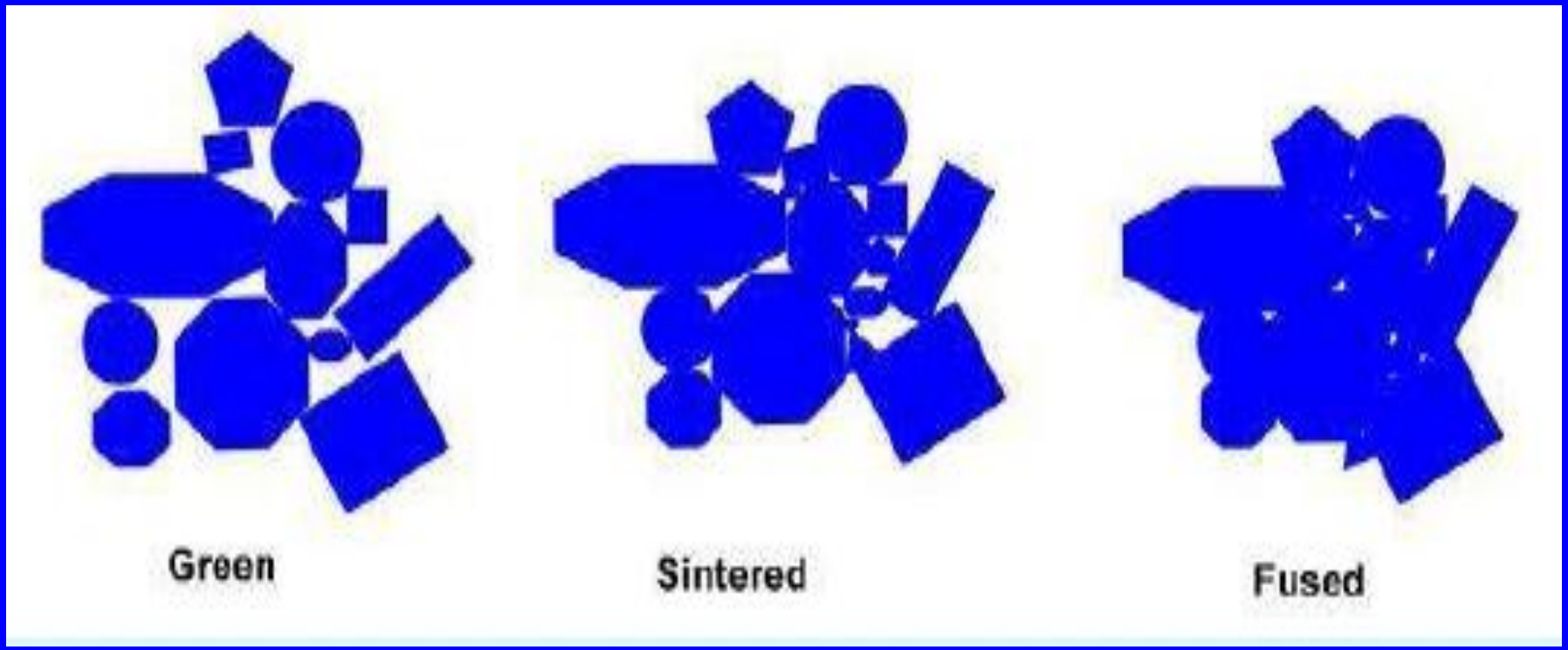
1. The first change: Involves the loss of water, which was added to the powder to form workable mass.

2. The second change: Occurs as the temperature is raised and the particles of porcelain fusion together by sintering.

N.B. Sintering: Is the process responsible for the fusion of the powder particles to form a continuous mass.


forming
sintering
Raw powder
Formed product
Sintered product


Sintering


Green
Sintered
Fused

Glazing:

Glazing is done to produce a smooth shiny and impervious surface.

The glazing stage is reached in the last firing. It is done either by flow of the glass at the surface from the ceramic restoration known as self-glaze porcelain, or a low fusing glass is added to it.

Self-glaze porcelain is preferred to an applied glaze because the later contains more glass modifiers and thus has a lower firing temperature and has a lower resistance to oral fluids.